Purulent inflammatory diseases of bones and joints. Purulent inflammatory diseases of soft tissues

ACUTE AND CHRONIC OSTEOMYELITIS

DEFINITION

- Inflammation of the bone caused by an infecting organism

HISTORY

- In the early 1900’s about 20% of patients with osteomyelitis died and patients who survived had significant morbidity.

INTRODUCTION

- Oldest known evidence of osteomyelitis fractured spine of dimetrodon permian reptile 291-250 million years ago
- Hippocrates 460-370 BC infection after fracture
- Nelaton credited with introducing the term osteomyelitis in 1844
- The key to successful management is early diagnosis and appropriate surgical and antimicrobial treatment.
- A multi disciplinary approach is required, involving an orthopaedic surgeon, an infectious disease specialist, and a plastic surgeon in complex cases with significant soft tissue loss.

CLASSIFICATION

- The duration - acute, subacute and chronic
- Mechanism of infection – exogenous or hematogenous
- The type of host response to the infection- pyogenic or non pyogenic

ACUTE HEMATOGENOUS OSTEOMYELITIS

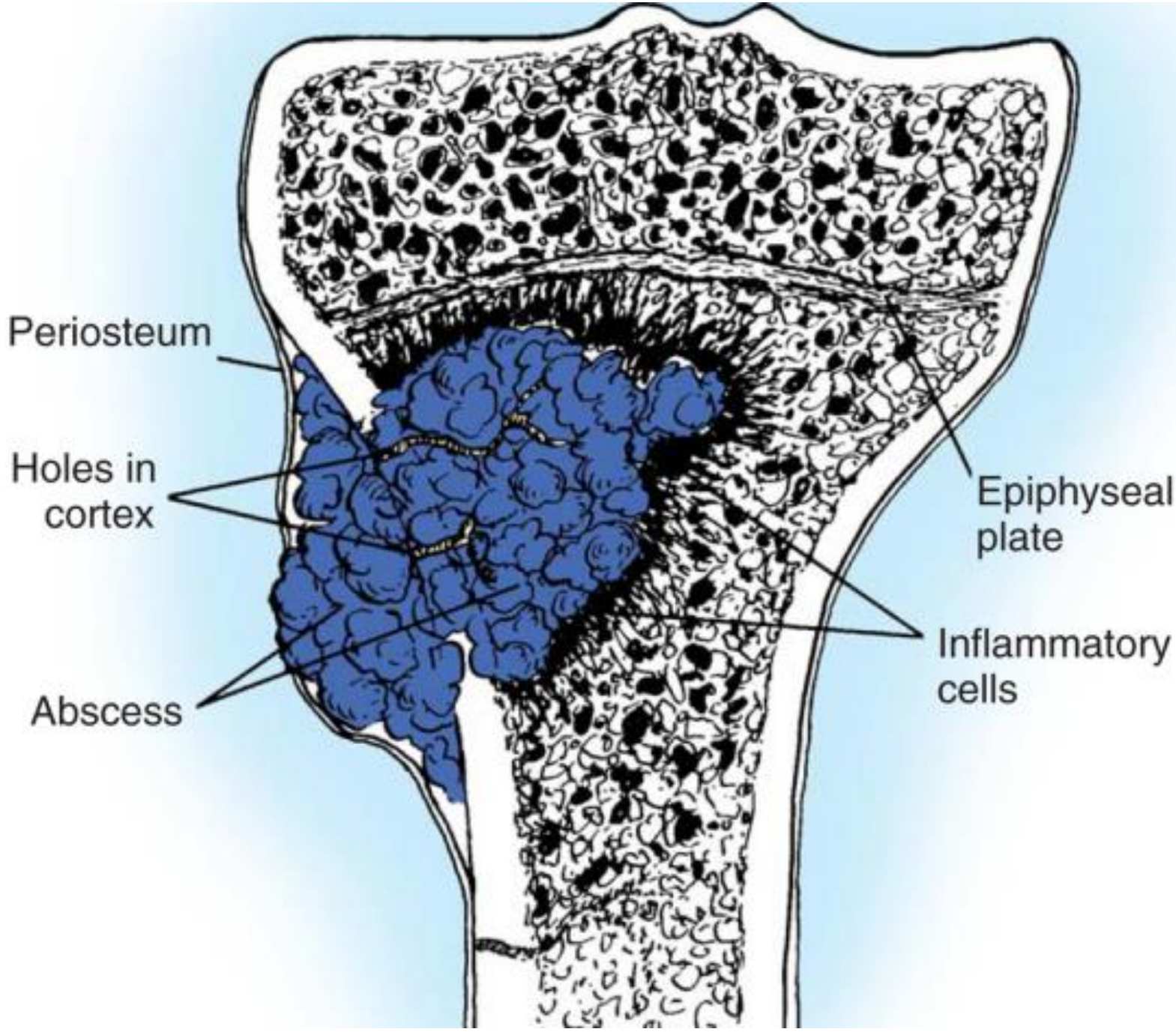
- Most common type of bone infection, usually seen in children
- Decrease in incidence, could be due to higher standard of living and improved hygiene.
- Bimodal distribution- younger than 2 years, and 8-12 years
- More common in males

PATHOPHYSIOLOGY

- In children the infection generally involves the metaphyses of rapidly growing long bones

- Bacterial seeding leads to an inflammatory reaction which can cause local ischaemic necrosis of bone and subsequent abscess formation

- As the abscess enlarges, intramedullary pressure increases causing cortical ischaemia, which may allow purulent material to escape through the cortex into the subperoisteal space.


Periosteum
Holes in cortex
Abscess
Epiphyseal plate
Inflammatory cells

- A subperisoteal abscess then develops
- If left untreated this process eventually results in extensive sequetra formation and chronic osteomyelitis
- In children younger than 2 years, blood vessels cross the physis, thus epiphysis may be involved

- Limb shortening or angular deformity may occur

- After the physes are closed, infection can extend directly from the metaphysis into the epiphysis and involve the joint

- Joint may be involved in some cases- hip joint most common, especially for intraarticular physes- proximal humerus,radial neck, distal fibula

- Metaphysis has relatively fewer phagocytic cells than the physis or diaphysis, hence more infection here

- In children older than 2 years the physis effectively acts as a barrier to the spread of a metaphyseal abscess

- Metaphyseal cortex thicker, hence diaphysis more at risk

- After the physes are closed, infection can extend directly from the metaphysis into the epiphysis and involve the joint

- Septic arthritis resulting from acute hematogenous osteomyelitis generally is seen only in infants and adults.

MICROBIAL PETTERN

- Staphylococcus aureus most common in older children and adults
- Gram negative bacteria- increasing trend- vertebral
- Pseudomonas most common in intravenous drug abusers
- Salmonella in sicke cell
- Fungal infections in chronically ill patients on long term intravenous therapy.

- Infants- staph aureus most common but group B streptococcus and gram negative coliforms
- Prematures staph aureus andgram negative organisms
- Hemophilus influenzae primarily in children 6 months to 4 years old, incidence decreased dramatically by immunizations

DIGNOSIS

- History and physical examination
    1. Fever and malaise
    2. Pain and local tenderness
    3. Sweliing
    4. Compartment syndrome in children

- Laboratory tests
    1. White blood cell count
    2. Erythrocyte sedimentation rate
    3. C-reactive protein
        checked very 2- 3 days post treatment initiation
    4. Aspiration for suspected abscess

DIGNOSIS. Plain radiographs

- Soft tissue swelling
- Periosteal reaction
- Bony destruction
  (10-12 days)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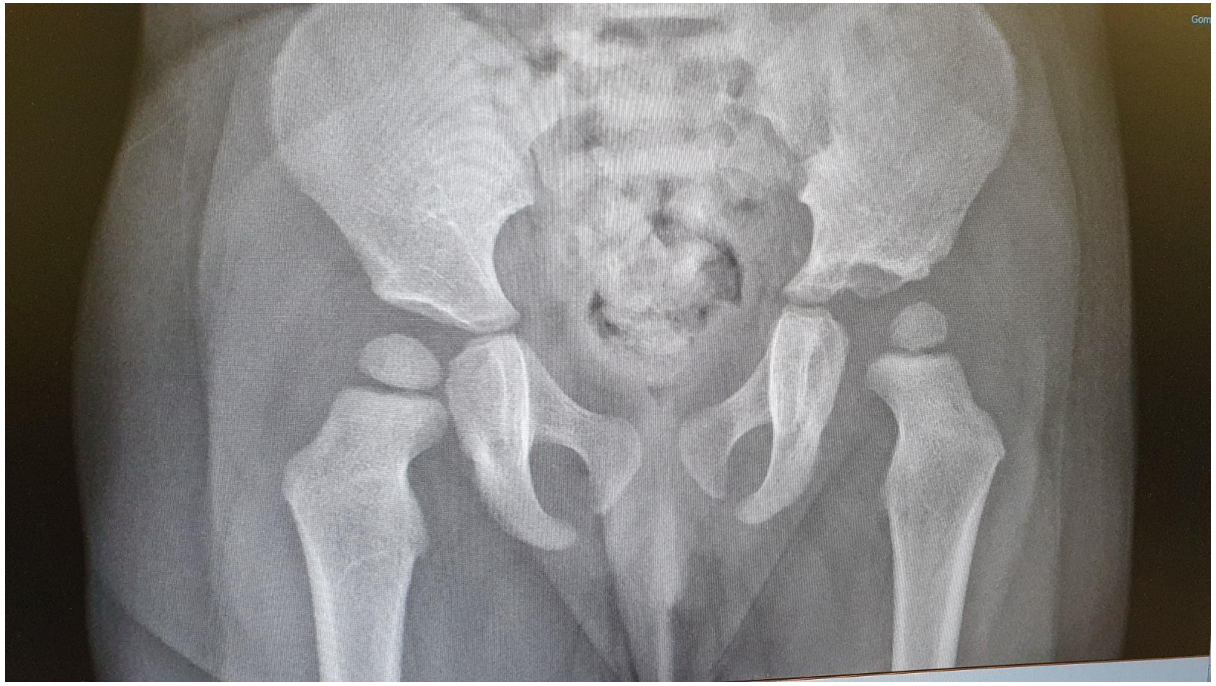
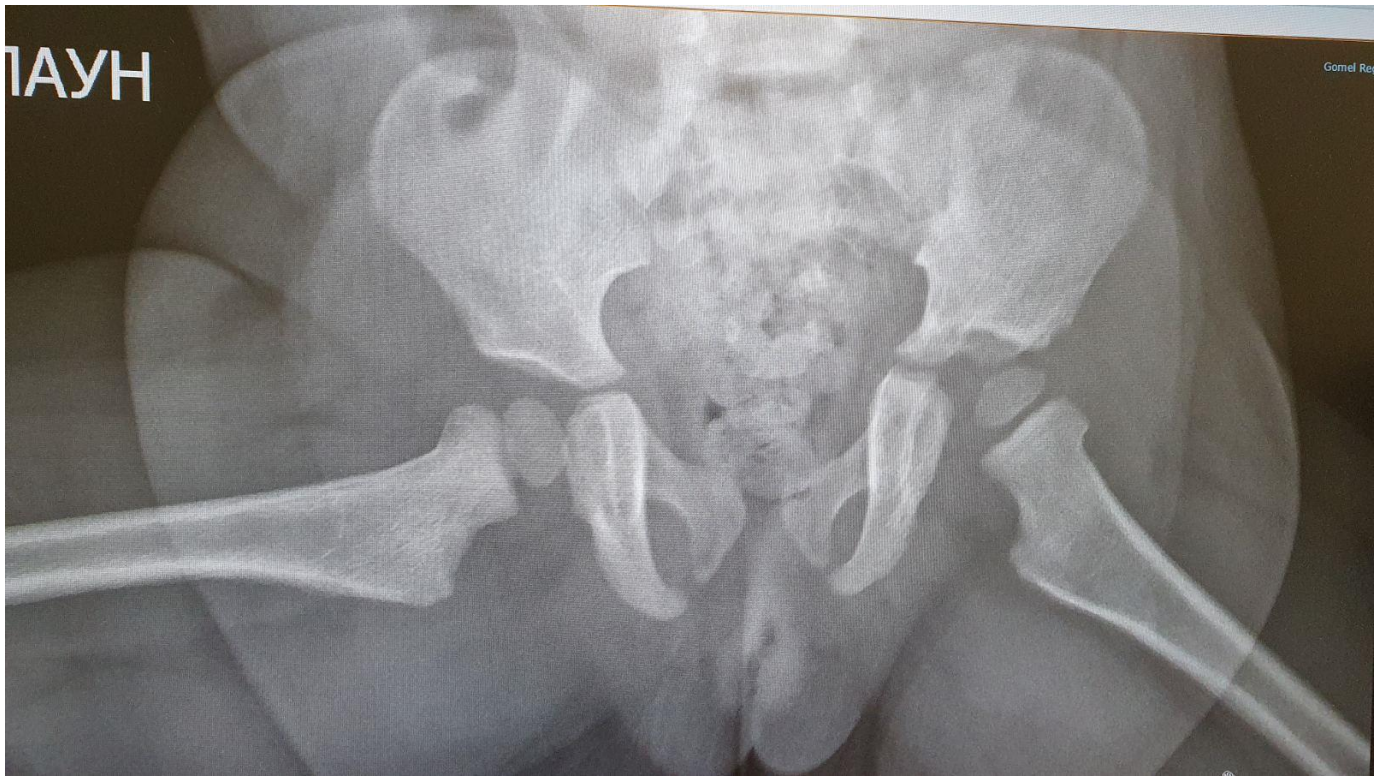



ЛАУН

Bone scan

Can confirm

diagnosis

24-48 hrs after

onset

TREATMENT

- Surgery and antibiotic treatment are complementary, in some cases antibiotics alone may cure the disease.

- Choice of antibiotics is based on the highest bacteriocidal activity, the least toxicity and the lowest cost

- Nade's 5 principles of treatment
    1. An appropriate antibiotic is effective before pus formation
    2. Antibiotics do not sterilize avascular tissues or abscesses and such areas require surgical removal
    3. If such removal is effective, antibiotics should prevent their reformation and primary wound closure should be safe
    3. Surgery should not damage already ischaemic bone and soft tissue
    4. Antibiotics should be continued after surgery

- The two main indications for surgery in acute hematogenous osteomyelitis are:
    1. The presence of an abscess requiring drainage

    2. Failure of the patient to improve despite appropriate intravenous antibiotic treatment
- The objective of surgery is to drain any abscess cavity and remove all non viable or necrotic tissue

- Subperiosteal abscess in an infant-several small holes drilled through the cortex into the medullary canal

- If intramedullary pus is found, a small window of bone is removed
- Skin is closed loosely over drains and the limb splinted
- Generally a 6 week course of intravenous antibiotics is given
- Orthopedic and infectious disease followup is continued for at least 1 year



COMPLICATIONS

- from other organs - sepsis, multiple organ failure, amyloidosis of the internal organs;
- of the bones and joints - pathological fractures,
- pathological dislocations,
- ankylosis,
- joint contractures,
- arthritis,
- artificial joints,
- bone deformities,
- shortening or lengthening of limbs.

pathological dislocation

pathological fracture

PATHOLOGICAL FRACTURE

SUBACUTE HEMATOGENOUS OSTEOMYELITIS

- More insidious onset and lacks severity of symptoms
- Indolent course hence diagnosis delayed for more than two weeks.

CLINICAL FEATURES

- The indolent course of subacute osteomyelitis is due to:
  1. increased host resistance
  2. decreased bacterial virulence
  3. administration of antibiotics before the onset of symptoms
- Systemic signs and symptoms are minimal
- Temperature is only mildly elevated
- Mild to moderate pain

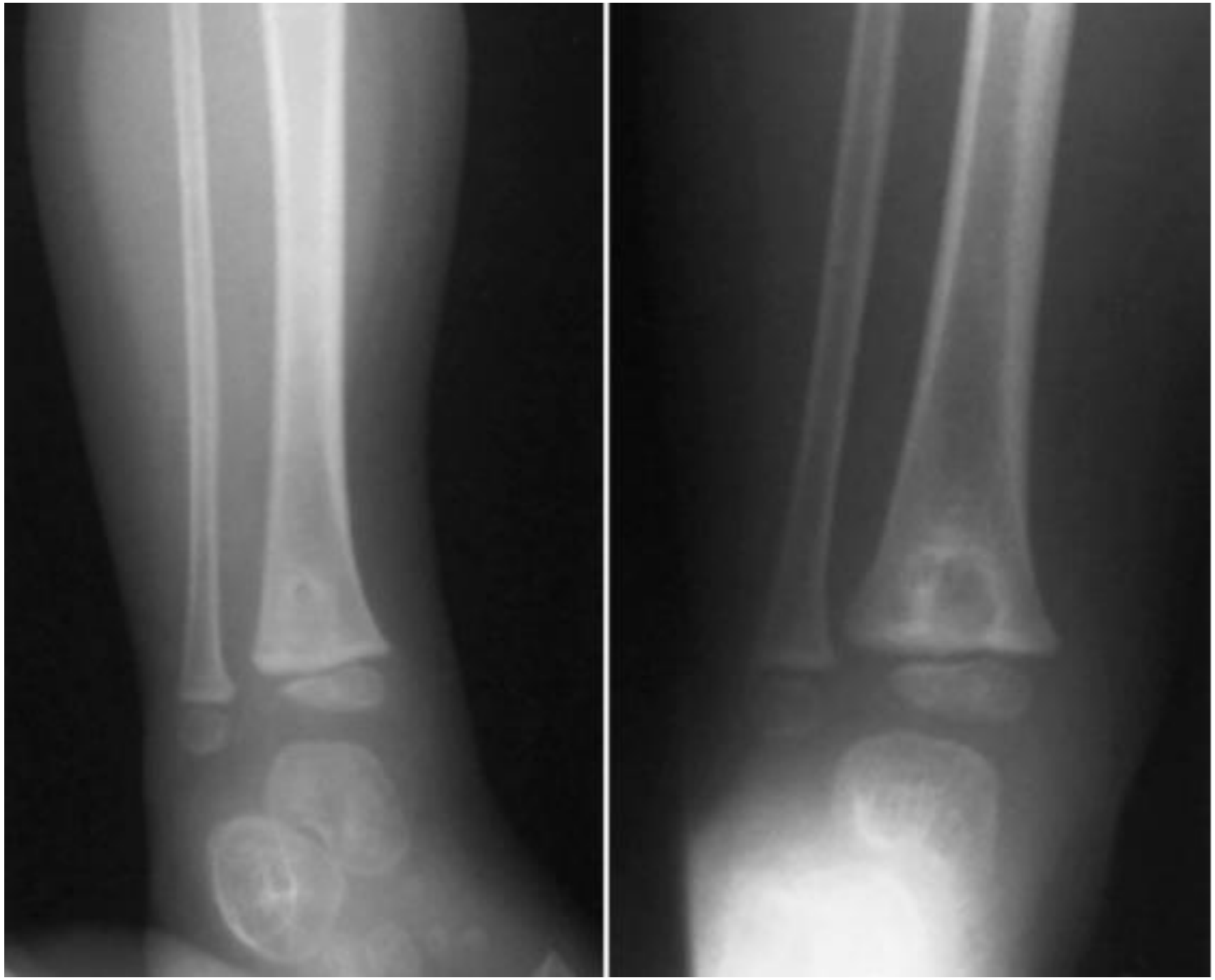
INVESTIGATIONS

- White blood cell counts are generally normal
- ESR is elevated in only 50% of patients
- Blood cultures are usually negative
- Plain radiographs and bone scans generally are positive
- S. Aureus and Staphylococcus epidermidis are the predominant organisms identified in subacute osteomyelitis

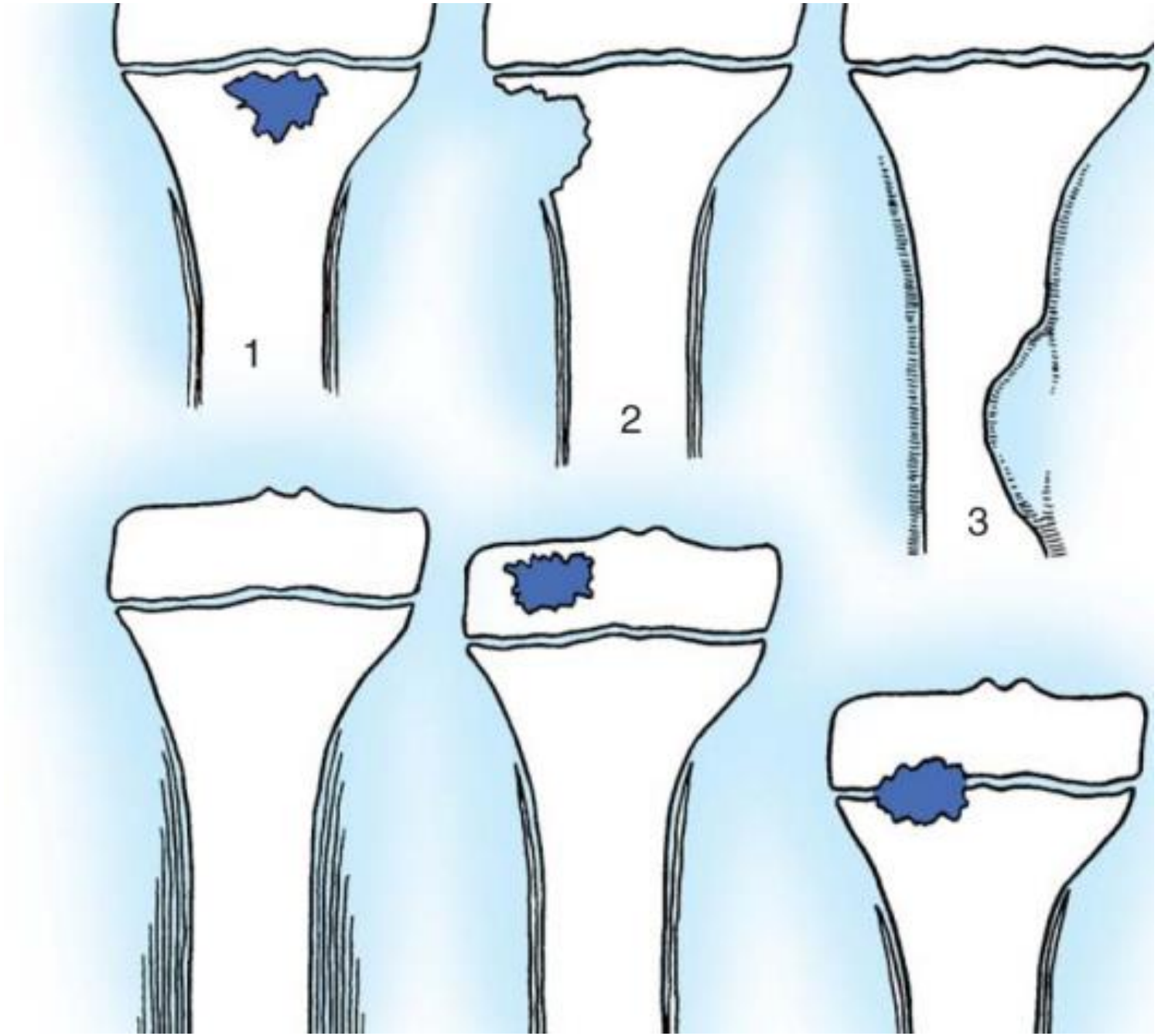
BRODIE ABSCESS

- Localized form of subacute osteomyelitis occuring most commonly in the long bones of the lower extremeties

- Intermittent pain of long duration is most times the presenting compliant, along with tenderness over the affected area



- On plain radiographs appears as a lytic lesion with a rim of sclerotic bone
- S aureus is cultured in 50% of patients and in 20% the culture is negative
- The condition requires open biopsy with curetage to make the diagnosis
- The wound should be closed loosely over a drain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TREATMENT

- Biopsy and curettage followed by treatment with appropriate antibiotics for all lesions that seem to be aggressive

- For lesions that seem to be a simple abscess in the epiphysis or metaphysis biopsy is not recommended- IV antibiotics for 48 hrs followed by a 6 week course of oral antibiotics

CHRONIC OSTEOMYELITIS

- Hallmark is infected dead bone within a compromised soft tissue envelope

- The infected foci within the bone are surrounded by sclerotic, relatively avascular bone covered by a thickened periosteum and scarred muscle and subcutaneous tissue

DIAGNOSIS COM

- Based on
  1. Clinical
  2. laboratory and
  3. imaging studies

LABORATORY COM

- Erythrocyte sedimentation rate
- C reactive protein
- WBC count only elevated in 35%
- Biopsy for histological and microbiological evaluation
    1. Staphyloccocus species
    2. Anaerobes and gram negative bacilli

IMAGINING STUDIES IN COM

- Plain X rays
    1. Cortical destruction
    2. Periosteal reaction
    3. Sequestra
    4. Sinography

IMAGIMG

- Isotopic bone scanning more useful in acute than in chronic osteomyelitis

- Gallium scans increased uptake in areas where leucocytes and bacteria accumulate. Normal scan excludes osteomyelitis

COM IMAGIMG

- CT Scan
    1. Identifying sequestra
    2. Definition of cortical bone and surrounding soft tissues
- MRI
    1. Shows margins of bone and soft tissue oedema
    2. Evaluate recurrence of infection after 1 year
    3. Rim sign- well defined rim of high signal intensity surrounding the focus of active disease
    4. Sinus tracks and cellulitis

TREATMENT OF COM

- Surgical treatment mainstay
    - Sequestrectomy
    - Resection of scarred and infected bone and soft tissue
    - Radical debridement
    - Resection margins >5mm

- Antibiotic duration is controversial
    - 6 week is the traditional duration
    - 1 week IV, 6 weeks of oral therapy
    - Antibiotic polymethyl methacrylate (PMMA) beads as a temporary filler of dead space
    - Biodegradable antibiotic delivery system

SURGICAL TREATMENT OF COM

- Adequate debridement leaves a dead space that needs to be managed to avoid recurrence, or bony instability
    1. Skin grafts,
    2. Muscle and myocutaneous flaps
    3. Free bone transfer
    4. Papineau technique
    5. Hyperbaric oxygen therapy
    6. Vacuum dressing

RESECTION OR EXECISION FOR COM

- Resection of a segment of affected bone may be necessary to control infection

- With techniques of bone and soft tissue transport, massive resections can be performed and reconstructed without significant disability.

SCLEROSING OSTEOMYELITIS OF GAREE’

- Bone is thickened and distended, but abscesses and sequestra are absent.
- Cause unknown
- Thought to caused by a low grade, possibly anaerobic bacterium

OMPHALITIS

Is an inflammation of the umbilical fossa and surrounding tissues. Inflammation can capture umbilical vessels and cause of umbilical sepsis. After falling umbilical residue umbilical wound healing may be delayed as a result of inflammation of this area. When connecting purulent infection occurs omphalitis.

CLASSIFICATION

There are 3 forms of omphalitis: simple, phlegmonous and gangrenous.

CLINICAL PICTURE OF OMPHALITIS

- In the simple form for a long time umbilical wound is healed. From navel stands out serous or seropurulent contents. The bottom of navel crusted. The general condition of kids is satisfactory, kids calm, put on weight, body temperature normal.
- In the phlegmonous form inflammation spreads to the surrounding tissues. At the bottom of the navel formed ulcer covered with fibrin, it stands out with pus. The skin around the navel hyperemic, infiltrated, hot to the touch. Children are restless, refuse feeding, they have increased body temperature to 38 – 39* C, there are signs of intoxication.

- Necrotic form of omphalitis in recent years, there are very rare. The inflammatory process In this case distributed not only on the periphery, but also in the depth of the abdominal wall. Occurs necrosis and exfoliation of the skin. In the most severe cases, necrosis involves all layers of the abdominal wall, may eventration bowel and peritonitis. In some cases, palpated thickened umbilical vessels.
- Complications: sepsis, peritonitis, liver abscesses.

DIFFERENTIAL DIAGNOSIS OF OMPHALITIS

- Funhus umbilicus - a pathological overgrowth of granulation, which fill the bottom of the navel. Looks like rounded glandular lesion from 0.5 to 1.5 cm in diameter at the bottom of the navel, pink and bleeds easily when touched, from navel released serous-purulent contents.
- Incomplete umbilical fistulas occurring in the absence of obliteration of the distal part of the yolk or urinary ducts. This is a serous – purulent discharge from the navel. Fistulas can be found in the study of bottom navel bellied probe. In the presence of fistula probe is at 1-2 cm depth.

TREATMENT

- In the simple form - toilet umbilicus by 3% solution of hydrogen peroxide, searing umbilical wound by 5-10% solution of silver nitrate, 2% alcohol tincture of iodine, bandages with antiseptic solutions (chlorhexidine, dioxidin dimeksyd).
- When aphlegmonous form conductedbphlegmon disclosure under local anesthesia. Patients prescribed antibiotics, imunotherapyy, UFO of navel area, UHF.
- When necrotic form omphalitis treatment is carried out as in necrotic phlegmon.

MASTITIS

MASTITIS IN NEWBROW

is an inflammation of the breast, which occurs mainly during its physiological engorgement. After birth, under the influence of hormones that are passed from mother's milk, breasts enlarged in several times and begin to excrete secret that resembles colostrum. Can occur infection of mammary glands through excretory duct or damaged skin, which leads to the appearance of purulent mastitis. Of inflammation contributes to gross squeezing content gland. Causative agent in most cases is Staphylococcus aureus.

CLINICAL PICTURE OF MASTITIS

- It starts acutely. The child becomes restless, worse appetite and sleep, body temperature rises to 38-38,5 ° C. Mammary glands increases in size, becomes dense. The skin over her flushed, determined local fever, tenderness. Then the skin over the gland becomes purplish - bluish color, increased tenderness, in the center of infiltration is determined fluctuations.
- Clinical forms: simple, phlegmonous, necrotic.
- In blood analysis - leukocytosis, elevated erythrocyte sedimentation rate.

TREATMENT

The operation is performed under general anesthesia. Engineering operations: over the place of softening conduct the skin incision a 1 - 1.5 cm in the radial direction from the nipple, not capturing the areola nipple. The edges of the wound raised, pus take on planting and susceptibility to antibiotics. The wound drain rubber graduate, bandage with antiseptic solution. When the distribution of inflammation, flaking skin, make additional incisions within healthy tissue. Assign also conservative treatment.

Surgery of mastitis in newborn

Necrotic phlegmon in newborns an acute diffuse purulent inflammation of the subcutaneous tissue, which occurs in children during the first weeks of life and is accompanied by the rapid development of necrosis subcutaneous tissue, skin and located deeper tissues (fascia, muscle, rib cartilage).

ETIOLOGY

Significantly different in morphology, clinical features and principles of treatment of a banal phlegmon. This is due to APF of skin, subcutaneous tissue and characteristics of the immunological reactivity of newborns.

NECROTIC PHLEGMON

Anatomical and physiological features of skin and fat tissue in newborn

- Tenderness of newborn skin;
- A large number of superficial blood vessels;
- Hydrophilicity tissues;
- Weak development of muscle and elastic fibers;
- Imperfection innervation and thermoregulation;
- Good secretory activity of the sebaceous glands and inadequate - sudoral;
- Gaps in local immunity;
- Increased mobility of the epidermis in relation to the basal layers of the skin

- Neutral pH of the skin;
- Subcutaneous fat has little anastomoses with vessels of skin;
- Weakly expressed connective membrane.
- This contributes to the rapid spread of the inflammatory process on the periphery, thrombosis of blood vessels, tissue necrosis, flaking skin.
- Ways of infection: the skin (inflammation of it, maceration) hematogenous route sepsis. The most common pathogen is Staphylococcus aureus, at least - Streptococcus.

PHATHOGENESIS

- Inflammation begins around sweat glands distributed on lymphatic vessels and crevices. Blood vessels trombuyutsya in their walls are signs of endo-and peryarteriyitu. Connective tissue around blood vessels nekrotyzuyetsya, it is the accumulation of bacteria. Disrupted communication subcutaneous tissue of the skin. The skin over the affected fat initially not changed, then violated its trophic, it peels off, then appears necrosis.

- Typical localization of necrotic phlegmon – rear and sides of the chest, lumbar and sacral area, buttocks, rarely - limbs.

CLINIC OF NECROTIC PHLEGMON

- **Toxic-septic** form (62% patients). It starts acutely, with the rapid development of intoxication. The child becomes restless, refuses the breast, body temperature rises to 38-40 ° C, disturbed sleep. Then the child becomes lethargic . Skin is gray tint. Tongue dry and coated. There tachycardia, muffled heart tones. Neurotoxycosis symptoms and multiple organ failure: depressed reflexes, the child does not respond to the review, there is frequent vomiting, loose stools, symptoms exsicosis. There enteroplegia

- **Simple form**: effects of intoxication developing slower and less pronounced.
- **Local manifestations** in both forms are the same. In places of the typical localization appears small area of hyperemia and edema of the skin, hot to the touch, painful, no clear limits, dense. This area is increasing rapidly in size. At the end of the first day hyperemia zone has clear boundaries around it is a swelling of the skin. In the center of this zone skin has purplish - cyanotic color, palpation determined softening. On the second - the third day there is a symptom fluctuations

- Can form small fistulas with serous-purulent discharge.
- At 5-6 day of disease, skin becomes thinner, starts tearing away of necrotic areas, there is a wound defect. Necrosis may extend to deeper located tissues (fascia, muscle, rib cartilage).
- After complete rejection of necrotic tissue inflammations subsides, the surface of the wound is covered with granulation

Necrosis of skin and fat tissue in newborn

Differential diagnosis. Erysipelas of newborn

Differential diagnosis. Adiponecrosis

SURGERY

- Phlegmon discloses by multiple sections 1-1.5 cm in length at a distance of about 2-3 cm apart in a checkerboard pattern, capturing the limits of healthy skin. It stands out from the wounds serous - purulent contents.
- With the development of skinmnecrosis with a clear demarcation line, which appears in the second week of the disease, transmitting necrosectomy

TREATMENT OF NECROTIC PHLEGMON

- Local treatment: UV, electrophoresis with antibiotics, laser irradiation.
- Dressing with chymotrypsin, ointment dressings, with Solkoseril, Vinilin, "Aekol", "Levomekol", "Vundehil."
- Detoxification therapy, UV blood.
- Passive immunotherapy. Antibiotic therapy.
- Oxygen therapy. Assign vitamins B and E, antioxidants.
- Inhibitors of proteases (Contrycal).

- Lymphadenitis – inflammation of the lymph node. Sometimes as the primary pathology as well as complications of other diseases. The emergence of suppurative lymphadenitis in children explained by anatomical and physiological features of lymphatic system of the child:
    1. Large sinuses;
    2. Thin and tender lymph node capsule;
    3. Increased susceptibility to infection;
    4. Imperfection the barrier function of lymph nodes.
    5. Typical localization: submandibular area, neck, inguinal and axillar areas.

ETIOLOGY

Occurrence of lymphadenitis preceded infectious and pustular diseases. Often sources of suppurative lymphadenitis, tonsillitis, flu, chronic tonsillitis, otitis media, exudative diathesis, pyoderma, injury of the skin and mucous membranes, carious teeth.

LINPHADENITIS

CLINIC

- There is disturbance, fever up to 38-39o, chills, loss of appetite, insomnia and tachycardia. Disturbing pain in the affected area.
- Local - swelling, edema, flushing of the skin. With the localization of the neck or under the jaw head is in a forced position (facing sideways, tilted).
- Palpation - induration (infiltration), pain in the center of infiltrate - softening fluctuations. Lymph node motionless its border are not clearly defined (inflammatory process moves to the surrounding tissue).

DIFFERENTIAL DIAGNOSIS

- In lymphogranulomatosis onset is not as sharp, palpation of lymph nodes is defined as "a sack of potatoes," they are moving, restricted painful, fluctuations not defined.
- In tuberculous lymphadenitis gradual onset, characterized by a long course without a highbody temperature. In the differential diagnosis help carefully collected history and Mantoux test.
- Strangulated inguinal hernia. Characterized by the sudden onset, vomiting, delayed stool.

Treatment of suppurative lymphadenitis

- Operation - opening and drainage of abscess. In doubtful cases must spend puncture of infiltration. Make skin incision 1.5-3 cm long taking into account the localization of vessels and nerves, clamp of Billroth stupidly diluted tissue. Abscess cavity is washed with a solution of hydrogen peroxide, chlorhexidine, draining a rubber band.
- Patients prescribed antibiotics, vitamins B, E, UHF or electrophoresis with antibiotics locally. In treatment it is important to eliminate the source of infection.

PARAPROCTITS

It is nonspecific purulent inflammation of tissues surrounding the terminal rectum. There are acute and chronic paraproctitis. Factors that contribute to the occurrence of acute paraproctitis: pyoderma and other inflammatory processes of perianal area. Have the importance constipation and mucosal trauma of the rectum. Paraproctitis classified as subcutaneous (95%), ishyorectal, submucosa, pelvic, rectal and retrorectal. Most often occurs before the age of 1 year. Typical localization - semicircle below the anus.

CLINIC

- The disease begins with fever up to 38-40 *. In the infancy the disease manifested anxiety, which increases during defecation, swaddling. The child refuses to eat, sometimes there is vomiting, loose bowel movements.
- Older children complain of pain in the area of the anus, which are aggravated by walking, defecating in a sitting position.
- Subcutaneous paraproctitis: around the anus determine edema, flushing of skin, tissue infiltration, tenderness, fluctuations.

- In a deeper location of focus in the first days external changes not found. In such cases it is necessary to digital rectal examination, and if necessary - review rectal mucosa in the mirrors.
- During the rectal examination determine the depth and size of infiltrate, the presence of fluctuations.
- On examination, the mucosa - hyperemia and swelling. Rarely observed spontaneous drainage of the abscess into the lumen of the anal canal.
- In the analysis of blood - leukocytosis and leukocyte formula shift to left.

TREATMENT

- Spend disclosure over the place fluctuations or above the center of infiltrate before reaching 1-2 cm to the anus, conduct revision of abscess cavity, separating tissue jumper. Pus take on bacteriological examination. Abscess cavity is washed with antiseptic and drain with a rubber strip or gauze turundas dipped hypertonic solution
- In pararectal spend fistula excision with the surrounding fat. The wound, which has the shape ofcone, loosely drained by turundas gauze with ointment

FURUNCLE. CARBUNCLE

- Furuncle - an acute necrotic inflammation of the hair follicle sebaceous gland and surrounding tissue. Causative more frequent is Staphylococcus aureus. In the etiology of great importance decreased immunity of the child.
- Multiple furuncles on different parts of the body called furunculosis. Characteristic localization: buttocks, lumbar area, legs, torso.
- Carbuncle - merging multiple boils or transition of inflammation from one follicle to another. In carbuncle inflammation extends to the subcutaneous tissue and fascia.

CLINIC

- Acute onset. The skin appears infiltrate in a cone, on top of it - a collection of pus. Is flushing of the skin, swelling of the surrounding tissues, pain on palpation. Within 3-7 days in the depth of infiltrate necrotising tissue, formed rod furuncle that eventually departs.

- In carbuncle locally defined edema, infiltration of tissue hyperemia, acute pain. In the center of infiltrate can be seen several purulent rods, from under which secreted purulent bloody fluid.

TREATMENT

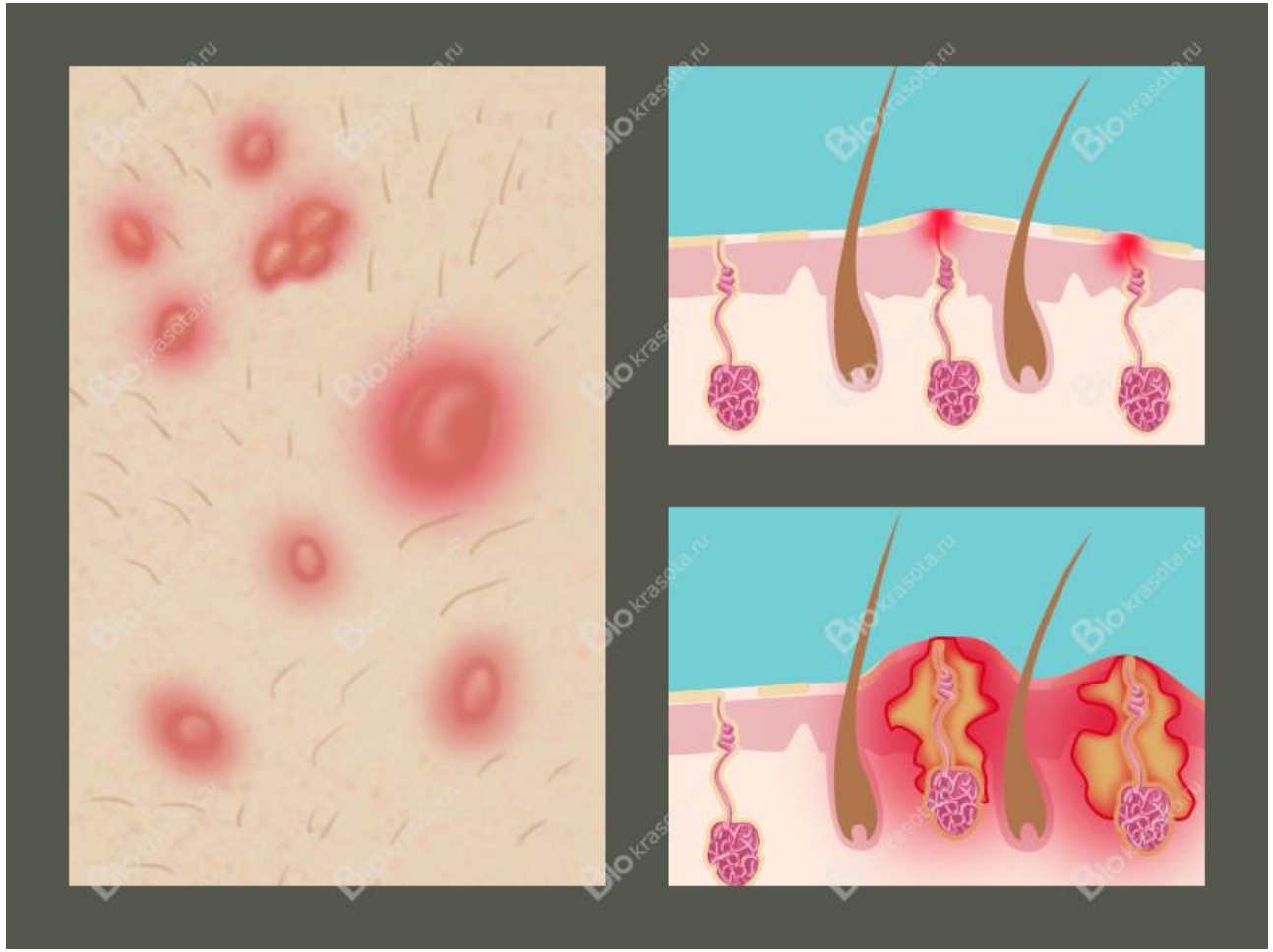
- In infiltrative stage furuncle hold conservative local treatment: UHF, ultraviolet irradiation, antibiotic with novocaine, packs of 20% solution of Dimeksid.
- At the formation of pus reveal furuncle under local anesthesia, removing festering rod, bandage with hypertonic solution.
- In carbuncle conduct extensive disclosure of its with obligatory removal of necrotic tissue and drainage.

FINGER’S PSEUDOFURUNCULOSIS

It is a purulent inflammation of eccrine sweat glands in children. The causative agent of the disease -golden or white staphylococcus.

PREDISPOSING FACTORS

- *immunodeficiency states,*
- *parenteral dyspepsia,*
- *irrational diet,*
- *insufficient hygienic care,*
- *rickets,*
- *excessive sweating.*



CLINIC

The disease is characterized by the appearance on the skin of the back, buttocks, nape, back of the thighs, inflammatory seals the size of a pea of stagnant red color, gradually increasing in size, suppuration and the formation of abscesses.

- The pustules increase, open with the release of creamy yellow-green pus. The disease proceeds paroxysmal with the spread of rashes throughout the skin. Pseudofurunculosis is accompanied by fever, general weakness; if untreated, it can be fatal.

- The disease is in many ways similar to boils, deep folliculitis, but differs from them in the absence of a necrotic rod, in the location of the sweat gland excretory ducts in the mouths (and not in the follicle mouth) and in the fact that it is formed in children under 1 year of age.

TREATMENT

Abscesses are treated by applying pure ichthyol to them in the form of a lozenge. Sometimes abscesses are opened with surgery. The skin around the lesions is rubbed with camphor alcohol. Water procedures in the acute period are prohibited. Antibiotics, sulfonamides are used, if necessary, γ-globulin is administered. General strengthening agents have a good effect.